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HISTORICAL NOTICE OF WESTMINSTER COLLEGE.

THE OLD DORMITORY. 1758.

I.

WESTMINSTER COLLEGE ranks among the first establishments in the kingdom; and of the youth there educated very many have been distinguished in different periods of our history, by becoming, to the honour of their country, eminent divines, statesmen, orators, poets, &c.

As early as the reign of Edward the Confessor, there was a school attached to Westminster Abbey; for Ingulphus, the historian of Croyland Abbey, states that he himself received his education at that school, and that often, when returning from Westminster School, Edgitha, the queen, would inquire of him touching his learning and lesson; and "falling from grammar to logic, wherein she had some knowledge, she would subtilely conclude an argument with him;" and afterwards send him home with cakes and money. Very few notices, however, remain to show the character of this early establishment. Fitz-Stephen, in his Life of Thomas à Becket, observes, that the three principal churches in the metropolis had schools attached to them, and these three appear to have been, St. Paul's, Westminster Abbey, and St. Peter's, Cornhill. Notices also exist of the salary paid by the almoner of the monastery in the reign of Edward the Third, to a schoolmaster who is described as *magister scholarum pro eruditione puerorum grammaticorum*. This salary was continued down to the dissolution of monasteries.

When the Abbey at Westminster, sharing the fate of its fellow-establishments, was dissolved by Henry the Eighth, the king was pleased to signify his intention of restoring some of these religious communities under a new character, and on different foundations. Westminster Abbey, therefore, was dealt very gently with, and was honoured with episcopal distinction. On the 17th of December, 1540, the king raised it by letters patent into a cathedral, with an establishment consisting of bishop, dean, and twelve prebendaries. The new bishop was Thomas Thirleby, dean of the king's chapel; the late Abbot of Westminster was appointed dean; the prior and five of the monks were made prebendaries; four other monks were made minor canons; and four more were sent as king's students to the two universities. The remaining members of the brotherhood were also provided for, being dismissed from their cloister with pensions, and allowed either to undertake some parochial office, or to live in seclusion, according as inclination might direct them.

A palace and a revenue were assigned to the bishopric, the former being the residence of the late abbot, and the latter derived from the estates of the dissolved Abbey: some of the Abbey lands were also assigned to the endowment of the dean and chapter. It likewise appears that the chapter was charged with the payment of four hundred pounds per annum, to ten readers or professors of Divinity, Law, Physic, Hebrew, and Greek; five in each of the universities. Also with the stipends of twenty students in those universities, amounting to

166*l.* 13*s.* 4*d.* Two masters and forty grammar scholars also formed part of the establishment as founded by Henry the Eighth.

In 1544, the church at Westminster was discharged from paying the stipends of the king's university students, on consideration of yielding up lands to the annual amount of 167*l.* And two years afterwards other estates were surrendered to the yearly value of 400*l.*, that the church might be released from the salaries of the professors. A portion of the latter sum was given to Trinity College, Cambridge, the rest to Christchurch, Oxford.

In 1550, Bishop Thirleby surrendered his bishopric, in submission to the will of Edward the Sixth, who re-united the diocese with that of London. Thus the episcopal dignity of the church at Westminster was of brief duration. No notice had been taken on this occasion in the king's letters patent of the Dean and Chapter of Westminster, and it appeared doubtful whether their canonical condition was to be considered as legal. This occasioned an act of parliament, which constituted the church a cathedral in the diocese of London. During this reign, there is record of the zealous efforts of one Alexander Nowell, formerly of Brasen-nose College, Oxford, to afford sound instruction to the youths in Westminster School. Anthony à Wood bears testimony, that such was his zeal to train the scholars in sound Protestant principles, that in the following persecuting reign, the cruel Bonner "would have consigned him to the shambles," had he not luckily made his escape from the country.

Under the government of Queen Mary, a total change took place in the church at Westminster. Again was its monastic character restored, and its subjection to the see of Rome effected. Cardinal Pole assumed the power of re-composing the chapter. He gave the new abbot possession, and took upon himself the whole of the regulations without even requiring the royal assent. During this state of things the school formerly connected with the church appears to have been entirely neglected and given up.

On the happy succession of Queen Elizabeth, Westminster Abbey was destined to undergo another change. It was re-suppressed as a monastery, and in 1560, re-established on its present foundation as a collegiate church, and endowed with all the lands possessed by the late abbots and monks. This foundation closely resembled that of Henry the Eighth, having a dean, twelve prebendaries, an upper and under master, and forty scholars. These arrangements have also remained undisturbed up to the present time. The second dean, after the re-establishment of this cathedral by Queen Elizabeth, took a precautionary measure for preserving the scholars from the effects of the plague then ravaging London. Holding the prebend of Chiswick at the same time, he obtained the privilege for his church of being tenant in perpetuity of the prebendal estate, that it might afford a place of refuge from any pestilential disease or epidemic for the chapter, the masters of the school, and the scholars. Thus it appears that on some occasions subsequently, the scholars were removed to Chiswick to escape the plague. The same dean, who bore the appropriate name of Goodman, appears to have given his serious attention to the improvement of the school. He brought the scholars into one spacious chamber, regulated the commons, and added to the accommodation of the masters. He is also supposed to have influenced the Lord Treasurer Burleigh in 1594, who gave a perpetual annuity of twenty marks, to be distributed among the scholars elected to the two universities.

During the civil wars, the Dean and Prebendaries of Westminster were in general dispersed, and the school seems to have shared the same fate. In 1645, however, parliament consigned the government of the church to a committee, and in 1649 this guardianship was further extended by an act for the continuance and support of the school and almshouses at Westminster. The church remained under the control of this committee until the Restoration in 1660, when affairs took their former course, and a dean was restored to the collegiate church of Westminster in the person of the learned and excellent Dr. John Earle.

Westminster School is not separately endowed with lands and possessions, but is attached to the general foundation of the collegiate church, as far as relates to the support of forty scholars. It is under the care of the Dean and Chapter of Westminster, and conjointly with the Dean of Christchurch, Oxford, and the Master of Trinity College, Cambridge, respecting the election of scholars to their several colleges. The boys on the foundation are called King's scholars, from the royalty of their founders, and are in a state of collegiate association. They sleep in the dormitory; have their dinner and supper in the hall; and may have, if they choose to claim it, a breakfast of bread and butter and beer, but the statute ordains that the breakfast hour shall be at six o'clock, and this is alone sufficient to prevent the boys from desiring the privilege. The king's scholars are distinguished from the town boys, who are far more numerous, by a gown, cap, and college waistcoat. This dress is furnished by the college, but in so coarse a material that it is customary for the scholars to provide others of a better fabric, but in the same fashion. For education and for special accommodations, the king's scholars pay the same as the town boys. The privilege by which they are distinguished is, that at the end of every fourth year, about eight or nine of their number are elected to Christchurch, Oxford, and Trinity College, Cambridge; in the former case to studentships worth from forty to sixty pounds per annum, in the latter to scholarships of of much less value. The election is in May, and much interest is required to get a boy elected to Oxford. But if interest is allowed to sway the election to the universities, it is not so with respect to the election of king's scholars. About thirty town boys propose themselves as candidates from the fourth, fifth, and shell forms, and are left to contend with each other in Latin and Greek, and particularly in grammatical questions and speaking Latin. Two boys will challenge for five hours together in grammar questions; and at the end of eight weeks of constant challenge, the eight boys at the head of the number are chosen according to vacancies; those who have presented themselves below the eight succeed according to the next vacancies, the head master sitting as umpire. This contest occasions the situation of the king's scholars to be much sought after by the boys of all ranks as a distinction; it becomes a solid groundwork of reputation, and incites a desire to obtain the election.

There are four boys also called bishops' boys; so denominated from their being established by Williams, bishop of Lincoln. They receive a gratuitous education, and are distinguished by wearing a purple gown: they do not, however, live in the college, or enjoy any other advantage, except a small annual allowance, which is not paid while they remain at Westminster, but is suffered to accumulate until the period of their admission to St. John's College, Cambridge, when with some additions it amounts to about twenty pounds a year for four years. These boys are nominated by the dean and the head master.

Among the head masters of Westminster School, from the time of its foundation, there are many eminent names. William Camden, the celebrated author of the *Britannia*, held that office in 1593; Dr. Busby, the eminent scholar, in 1638; the learned and indefatigable Dr. Vincent, in 1788.

The expense of Westminster School, as it relates to the forty foundation boys, or king's scholars including

the salaries of the masters, is stated in the Government Report not to exceed 1200*l.* per annum. The collegiate salaries are 39*l.* 6*s.* 8*d.* to the upper, and 15*l.* to the under master, with houses for their residence. What they receive individually from the scholars for instruction, is a remuneration apart, with which the church has no concern. The annual payment to the masters is different in different years. It is thirteen guineas the first year, whether for a town boy or king's scholar, ten guineas the next two years, and eight guineas the last year. The assistant masters are not of collegiate institution, and are proportioned to the state of the school: their incomes also arise from the scholars, for of the thirteen guineas paid for education, six go to the masters, and the rest to different ushers. Boarding-houses are provided for the accommodation of the town boys. There are five of these, in each of which an usher resides and superintends the inmates. Further particulars concerning this celebrated institution will be given in a second notice.

OLD ENGLISH NAVIGATORS.

Captain John Davis.

I.

In the year 1585, "certaine honourable personages and worthy gentlemen of the court and country, with divers worshipful merchants of London and of the west countrey, mooved with desire to advance God's glory, and to seek the good of their native countrey, consulting together of the likelihood of the discovery of the north-west passage, which heretofore had bene attempted, but unhappily given over by accidents unlooked for, which turned the enterprisers from their principall purpose, resolved, after good deliberation, to put downe the adventures to provide for the necessarie shipping, and a fit man to be chief conductour of this so hard an enterprise." According to Hakluyt, (whose authority we follow in the present narration,) the most active merchant of the company was William Sanderson, who, "besides his travaile, which was not small, became the greatest adventurer with his purse, and commended unto the rest of the company one Mr. John Davis, a man very well grounded in the principles of the arte of navigation, for captaine and chief pilot of this exploit."

This celebrated navigator was born at Sandridge, in the parish of Stoke Gabriel, near Dartmouth, in Devonshire. His residence near that sea-port probably excited his taste for the life of a seaman. Accordingly, at an early age, he went to sea, and with the assistance of a good master, and his own skill and industry, he soon became one of the ablest navigators of his time. Being furnished by the London merchants with two small barks, "the *Sunneshine* of London and the *Mooneshine* of Dartmouth," of fifty and thirty-five tons respectively, Davis departed from Dartmouth on the 7th of June. After experiencing, as usual, some delays from contrary winds, they came, on the 19th of July, to the sixtieth degree of north latitude; and in a very calm sea, they heard "a mighty great roaring, as if it had been the beach of some shore;" the fog being great, and fearful of running suddenly upon land, they sounded, but found no ground at three hundred fathoms: the captain then proceeded in a boat towards this supposed beach, and was soon encompassed by numerous icebergs, and greatly astonished to find that the noise was occasioned only by the rolling of the ice together. Davis broke off some pieces of the ice, which, being carried to the ship, were converted into good water. On the next day they discovered the southern coast of Greenland, "the most deformed, rockie, and mountainous land that ever we saw; the first sight whereof did show as if it had bene in forme of a sugar-loafe, standing to our sighte above the cloudes, for that it did showe over the fogge like a white liste in the skie, the tops altogether covered with snow, and the shoare beset with ice a league off into the sea, making such irksome noise, as that it seemed to be the true pattern of desolation, and after the same our captain named it 'The Land of Desolation.'" Perceiving that they were run into a very deep bay, wherein they were almost surrounded with ice, they kept coasting along the edge of it, south-south-west, till the 25th, when they discovered that the shore lay directly north. They therefore altered their course to the north-west, in hopes of finding the desired passage; but, on the 29th, they discovered land to the north-east, in latitude 64° 15′. On approaching the coast, (which, however, was still Greenland,) they found some good roads for shipping, and many inlets in the land, whereby they judged this land to be a number of islands standing together. Having landed upon a small island, they discovered some tokens of inhabitants, for they found "a small shoo, and pieces of leather sewed with sinews, and a piece of fur and wool like to beaver." They then proceeded to another island, and having ascended an eminence, the people of the country espied them, and made a lamentable noise like the howling of wolves. In order to get on friendly terms with these people, Davis sent for his musicians, and caused them to play while a part of the crew danced. The natives gradually approached in their canoes, near enough to talk,—"their pronunciation was very hollow through the throat." At length one of them, pointing to the sun, "would presently strike his breast so hard, that we might heare the blow. This he did many times before he would any way trust us. Then John Ellis, the master of the *Mooneshine*, was appointed to use his best policie to gaine their friendship; who strooke his breast, and pointed to the sunne after their order; which, when he had divers times done, they beganne to trust him, and one of them came on shoare, to whom we threw our cappes, stockings, and gloves, and such other things as then we had about us, playing with our musicke, and making signes of joy, and dancing. So the night comming, we bade them farewell, and went aboord our barks."

The next day no less than thirty-seven canoes were in motion about the ships, the natives calling to the sailors to go ashore; but not being in a hurry to do so, one of the natives ascended a rock, and jumped and danced, displaying a seal's skin, and making a noise on a sort of timbrel, which he struck with a stick. Whereupon Davis, having ordered the boats to be manned, rowed up to them; and having mutually pointed, with certain gestures, to the sun, a great confidence arose, and barter proceeded briskly. "We bought five canoes of them; we bought their cloathes from their backs, which were all made of seale's skinnes and bird's skinnes; their buskins, their hose, their gloves, all being commonly sowed and well dressed; so that we were fully perswaded that they have divers artificers among them. We had a paire of buskins of them full of fine wooll, like beaver. Their apparell for heat was made of bird's skinnes, with their feathers on them. We saw among them leather dressed like glover's leather, and thick thongs like white leather of a good length. We had of their darts and oares, and found in them that they would by no means displease us; but would give us whatsoever we asked of them, and would be satisfied with whatsoever we gave them. They took great care one of another; for when we had bought their boats, then two others would come and carry him away between them that had sold us his. They are very tractable people, void of craft or double dealing, and easy to be brought to any civility or good order; but we judge them to be idolators, and to worship the sunne."

The natives promised to return next day with a quantity of furs and skins, which they saw were highly valued by the foreigners; but a favourable breeze arising, and Davis having understood by signs from these people that there was a great sea towards the north and west, proceeded on his voyage. He steered

across the strait which bears his name, and on the 6th of August found land in latitude 66° 40′, quite free from "the pester of ice," and anchored in a safe road under a great mountain, of which the cliffs were as "orient as gold." This mountain he named Mount Raleigh: the road where their ships lay at anchor, Totnes Road; the bay which encompassed the mountain, Exeter Sound; the fore-land towards the north, Dier's Cape; and that towards the south, Cape Walsingham. While at anchor, the seamen saw three white animals, which seemed to be goats. Anxious to procure fresh victuals and some sport, they gave chace, but discovered, not goats, but enormous white bears. The animals rushed on furious and fearless, till, being received with several balls, they retreated, apparently not much hurt, but were pursued, and at length killed. They appeared to have fed on nothing but grass; it was, however, necessary to remove large quantities of fat before the flesh could be eaten. On the 8th of August he left this place, and coasting for some days, arrived at the cape which he had before reached. This promontory he named "The Cape of God's mercy," as being the place of their first entrance for the discovery. Turning this cape, they came to a very fine strait or passage, twenty or thirty leagues broad, free from ice, and the water apparently the same as in the ocean. This passage still retains the name of its discoverer,—"Davis's Straits." Having ascended about sixty leagues along this strait, they discovered several islands in the mid-channel, on some of which they landed: the coast was very barren, without wood or grass, and the rocks were like fine marble, veined with different colours. On one of these islands the seamen heard the howl of dogs, and saw a number approach, of wolfish appearance, but apparently peaceably disposed. Impressed with the idea that on these shores animals of prey were only to be found, they fired, and killed two; round the neck of one of which they found a collar, and soon afterwards discovered the sledge to which he had been yoked. Although the islands in this sound were numerous, yet the passage was open, and the hopes of our navigators were daily increased, that, by pursuing this track, the north-west passage might be discovered; but about the 20th of August, the wind appearing to settle in a contrary direction, and dreading the approach of winter, they determined to return home. After a safe passage, they reached Dartmouth on the 29th of September.

DESCRIPTION OF A FOLIO.

THAT weight of wood, with leathern coat o'erlaid;
Those ample clasps, of solid metal made;
The close-prest leaves, unclosed for many an age,
The dull red edging of the well-fill'd page;
On the broad back the stubborn ridges roll'd,
Where yet the title stands in tarnish'd gold:
These all a sage and labour'd work proclaim,
A painful candidate for lasting fame:
No idle wit, no trifling verse can lurk
In the deep bosom of that mighty work;
No playful thoughts degrade the solemn style,
Nor one light sentence claims a kindred smile.
Hence, in these times, untouch'd the pages lie,
And slumber out their immortality.
They *had* their day, when, after all his toil,
His morning study, and his midnight oil,
At length an author's ONE great work appear'd,
By patient hope, and length of days, endear'd;
Expecting nations hail'd it from the press;
Poetic friends prefix'd each kind address;
Princes and kings received the pond'rous gift,
And ladies read the work they could not lift.—CRABBE.

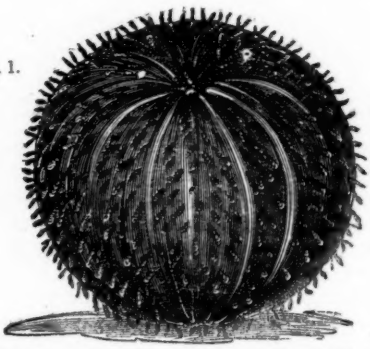
NEVER talk of your schemes before they are executed; lest, if you fail to accomplish them, you be exposed to the double mortification of disappointment and ridicule.

ECHINI, OR SEA-EGGS.

I.

WHILE many of the zoophyte inhabitants of the ocean take the form of branches, leaves, and flowers, there are vast numbers which have been popularly named sea-eggs, and sea-stars. The former of these we are now about to describe. The Echini, or Sea-eggs, as they exist in the ocean, are animals having a calcareous shell of a roundish, oval, or conical figure, and mostly covered with moveable prickles. While bristling with these prickles or spines, the animal is called sea-urchin, or sea-hedgehog; but when these fall off, the shell is more commonly known as a sea-egg. The variety in these animals is so great, that to describe their various forms, certain genera have been named turbans, diadems, mermaid's skulls, or hearts, or fairy stones.

Fig. 1.



THE COMMON ECHINUS, (*Echinus esculentus,*) covered with its spines.

The common echinus may be taken as the type of this curious order of animals, although, from the variations in the several genera, the description of one species cannot be fully applicable to others. The excellent description of this animal given in the article on Zoophytes, in the *Encyclopædia Britannica*, furnishes us with materials for the following notice. The shell of the common echinus is of a globular figure, with a flattened base, formed of ten plates, united by ten others, and all proceeding from the rim of an aperture in the base, and rising upwards. These plates converge towards the top, and are united in a circle opposite the mouth, by a series of small plates. The first series of plates is called *areæ*, by Linnæus, and those by which they are joined together, and which are all narrow, and of the same size, he named the *ambulacra*, from a fancied resemblance to the walks between the parterres of a garden, laid out after the olden fashion. Tubercles of different sizes cover these *areæ*, and on a close examination, it will be seen, that a zig-zag line divides each area into two equal parts, composed of numerous long hexagons set in cross rows, and dove-tailed into each other with the most perfect accuracy. The tubercles, with which the shell is thickly studded, support the spines or bristles which are so remarkable in the animal. These move on a pearly globular pivot that sinks into a corresponding cup in the base of the spine, and are retained in their place by the soft epidermis or skin that covers the whole of the shell in its fresh condition. The primary spines are frequently large in proportion to the shell, but with these are generally intermingled smaller ones of three descriptions, *i. e.*, spines of the same form as the primary ones, but much smaller; others, slender as a hair, but dilated into a club at each end; and a third kind on a flexible stalk, supporting three moveable prongs placed in a triangle. The functions of these last are unknown, and they have been mistaken for parasitical animals infesting the echinus. The *ambulacra* have no spines, but are perforated from top to bottom with holes, arranged in a regular pattern. From these holes are protruded slender fleshy tubes, with

suckers at the end, which aid the animal in its progressive motion.

The mouth of this animal is armed with a most complex apparatus of calcareous jaws, arches, and teeth, consisting of twenty-five separate pieces. For the movement of these parts separate muscles are provided, of which the anatomy has been minutely described by Cuvier. In the shells of the echini which are cast on shore, this frame-work is often found entire in the inside of the case, and Aristotle having found in it a resemblance to a lantern, it has therefore been called "the lantern of Aristotle." But there are other echini which are entirely destitute of this apparatus, being without teeth, and having at the mouth only a narrow transverse slit. From this variation of form, it is natural to suppose that the food of the different species of echinus is also various. Mr. Kirby, speaking of the common echini, informs us, that their station is often near the shore upon submerged ledges of rocks, and that they feed upon whatever animals they can seize, sometimes turning upon their back and sides, and sometimes moving horizontally. "This enables them more readily to secure their food, with the aid of the numerous suckers in the vicinity of their mouth, which, when once they are fixed, never let go their hold till the animal is brought within the action of their powerful jaws. Lamarck thinks that they do not masticate, but only lacerate their food; but as two faces of each of their pyramidal organs answer those of the two adjoining ones, and these faces are finely and transversely furrowed, this looks like masticating surfaces. Bose, who appears to have seen them take their food, says it consists principally of young shell-fish and small crustaceous animals. As the latter are very alert in their motions, it is difficult for the sea-urchins to lay hold of them; but when once one of these animals suffers itself to be touched by one or two of the tentacles of its enemy, it is soon seized by a great number of others, and immediately carried towards the mouth, the apparatus of which developing itself soon reduces it to a pulp."

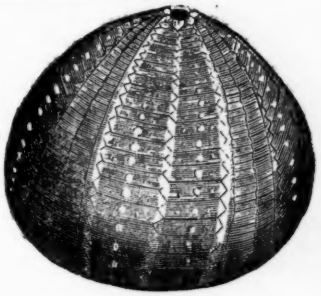
The development of the echini from the time of their first leaving the egg, has not come within the observation of any naturalist, but the young of *Echinus esculentus* has been examined when only one-eighth of an inch in diameter, and found to have the form and armature of the full-grown animal. The prickles were toothed along their edges; but those spines which in the perfect state have three prongs, as already described, were only provided with two. The globular form was perfect in the young animal; but the shell was composed of few pieces. It may appear contrary to the general law which regulates the mode of increase in these animals, that the shell should be thus perfectly formed in miniature, for it appears necessary whenever cells, intended for the lodgment of soft organs, are to be formed of hard materials, that the foundation should be laid upon a scale suited to the after-growth of the animal, otherwise the soft parts within would be so confined and contracted that they must cease to grow altogether. But in the case of the echini, provision is made for the expansion of the shell itself, for each shell is divided into a number of small pieces, and each piece has that polygonal form which is best suited to the perfect junction of the whole. Small additions are therefore constantly being made to the margins of each of these polygonal pieces, and the expansion goes on exactly in proportion to the growth of the soft parts of the animal within.

The roe of this animal occupies much space within the shell, being very large in proportion to the animal and its other viscera; and it is in the spring, when the roe is fully developed, that this animal is in some places used as food, as its name imports. An old writer speaks of the sea-egg, as being eaten by the poor in many parts of England, and by the better sort abroad. It is recorded that these animals formed one of the favourite dishes among the Greeks and Romans. "They were dressed with vinegar, honied wine, or mead, parsley, and mint; and esteemed to agree with the stomach. They were the first dish in the famous supper of Lentullus, when he made Flamen Martialis priest of Mars. By some of the concomitant dishes they seemed designed as a whet for the second course to the holy personages, priests, and vestals invited on the occasion." They are also mentioned at the marriage feast of Hebe. "Thither came crabs and *urchins*, unable to swim in the sea, but travelling only on the ground." In the *Wasps* of Aristophanes, likewise, the hero of the piece repeats a fable respecting an urchin, who, when his shell had been cracked by a woman, summoned witnesses to prove the assault. He is interrupted by the remark, that it would have been wiser of the animal to buy a bandage than to spend his time in proving the assault. Horace mentions the echinus several times as very good eating.

The seas of warm and tropical countries are the most productive of these animals; but notwithstanding the number of living species, the fossil remains very far exceed them. These are found principally in the chalk and oolite formations, and are so abundant, and so well preserved, that there are few collections of fossils in which we may not meet with numerous specimens.

The empty shells of the echini are sometimes found in considerable numbers on our western coasts, especially after the Atlantic has been much agitated by storms. They are shaped more like an apple than an egg, having a small aperture at the top, and another at the opposite extremity. In this state the projecting suckers, spines, and bristles, have all been broken off, leaving the minute apertures reaching from one end to the other in regular rows, something in the same manner as the meridians of a globe.

Fig. 2.



Echinus melo.

THE microscopic examination of the teeth reveals correspondences and differences in their structure in the various groups of vertebrated animals, so constant and easily recognised, that from the smallest fragment of a fossil as well as recent tooth, not only the class and order, but even the family, and, in some instances, the nearest allied genus of the animal to which the tooth belonged, may be told with certainty.

AUSTRALIAN METHOD OF FINDING HONEY.

THEY catch one of the wild bees and attach to it, with some resin or gum, the light down of the swan or owl. Thus laden, the bee makes for the branch of some lofty tree, and so betrays its home of sweets to the keen-eyed pursuers.—MITCHELL'S *Australia.*

BY the evidence of all history, savage tribes appear to owe their first enlightenment to foreigners;—to be civilized, they conquer or are conquered—visit or are visited.

IT must always be remembered, that the actions of public men will be the subject of thought at a future period; when interest is stifled, and passion is silent; when fear has ceased to agitate, and discord is at rest; but when conscience has resumed its sway over the human heart. Nothing but what is just, therefore, can finally be expedient, because nothing else can secure the permanent concurrence of mankind.—ALISON'S *History of Europe.*

METALLOCHROMY, OR THE ART OF COLOURING METALS.

IT is generally supposed that the blue colour imparted to steel, results from a thin film of oxide formed upon the surface of the metal when exposed to a certain temperature. About fifteen years ago, Professor Nobili, of Reggio, offered a new explanation of this fact, and discovered a method of imparting colour to metallic surfaces: as his results are extremely beautiful and varied, a brief notice of them may be acceptable.

The following is one of the principal experiments connected with what the inventor appropriately terms the Art of Metallochromy. A plate of platinum is placed horizontally at the bottom of a glass or china vessel. A platinum point is suspended vertically over this, in such a manner, that the distance between the point and the plate may be about half a line. A solution of acetate of lead is next poured into the vessel, so as not only to cover the plate, but to rise two or three lines higher than the point. The plate and the point are now brought into communication, the former with the positive, and the latter with the negative pole of a voltaic battery. At the moment when the voltaic circuit is closed, a series of coloured rings appear on the surface of the plate precisely under the point. These rings are similar to those described as Newton's rings in our *Philosophy of a Soap-bubble**, but in an inverse order: Newton's rings begin at the centre; Nobili's at the circumference, where, from the nature of the electro-chemical process, the thinnest layers are deposited: the thickest layers are evidently those at the centre.

This fact, which could not fail to strike any one observing it for the first time, led to the discovery of others. "Science never consults its interests so truly," remarks Professor Nobili, "as when it aims at some useful object connected with the arts." He foresaw the advantages the arts were likely to derive from this new method of colouring metals, and attended seriously to its application. His object was, instead of producing rings of various colours upon a plate of metal, to cover its surface uniformly with any desired tint. The colours being obtained by the effect of very thin plates applied to the surface of metals, it is easy to conceive how difficult it was to preserve such plates of a uniform thickness over the whole of an extensive surface. "Great, however, as the difficulties were, I thought I owed it both to art and to science, to do my utmost to surmount them. I thought it due to art, because this would be extended by means of the uniformity of the tints; and to science, because in the tints produced by plates of a particular thickness, the experimental philosopher would find the means of investigating, with peculiar advantage, the nature and properties of colours."

By substituting plates for the platinum point which forms the coloured rings, it was found that a surface of metal could be covered with one uniform tint. In 1828, Professor Nobili presented several such productions to the French Institute, and afterwards to our Royal Society, and particular attention was excited by the beauty and vividness of the tints, the precision of the outlines, and the softness of their blendings.

Although the efforts of this ingenious philosopher were attended with complete success, his methods so easy in their practical application, and the results so beautiful; although, too, the attention of scientific men was directed to the subject, it is remarkable that this new art was practised by its inventor only up to the time of his death, since which it appears to have been quite forgotten. Not only would this art be valuable to workers in metal generally, but the artist would find in it a wide field for observation and study. Professor Nobili has arranged the tints produced by his method in their natural order, so as to form a scale, or gamut, which he has designated by the epithet *chromatic*. This scale consists of forty-four tints, each of which is applied to a plate of steel. The tints are disposed in the same order as the layers or films by which they are produced: the colour of the thinnest film is placed first, and the others follow in the order of the progressively increasing thickness of the plates. In this arrangement the layers or films which produce the several colours are all applied by the same electro-chemical process. The voltaic battery, the solution of acetate of lead, the distances, all remain exactly the same. There is nothing variable but the duration of the action, which, in respect to the layer No. 1, is very short, a little longer in respect to the second, and increases progressively from the lowest to the highest number.

CHROMATIC SCALE.

44. Rose lake	Corresponding to the Fourth ring.
43. Reddish yellow green	
42. Yellowish green	
41. Green	
40. Greenish violet	
39. Violet lake	
38. Rose lake	Corresponding to the Third ring.
37. Rose orange	
36. Greenish orange	
35. Orange green	
34. Yellow green	
33. Yellowish green	
32. Green	
31. Greenish purple	
30. Bluish lake	
29. Purpled lake	
28. Brilliant lake	Corresponding to the Second ring.
27. Lake	
26. Orange lake	
25. Orange red	
24. Red orange	
23. Reddish orange	
22. Orange	
21. Orange yellow	
20. Brilliant yellow	
19. Yellow	
18. Very bright yellow	
17. Yellowish azure	
16. Azure	
15. Clear blue	
14. Blue	
13. Deep blue	
12. Indigo	
11. Violet	
10. Violet red	Corresponding to the First ring.
9. Violet ochre	
8. Ochre	
7. Copper red	
6. Brilliant tawny	
5. Tawny	
4. Brilliant blond	
3. Golden blond	
2. Blond	
1. Silver blond	

The effect produced by these tints, when disposed in the above order, baffles description; it bears a resemblance, however, to that produced on the ear by a scale of semitones, executed by a perfect voice. "I have shown my scale to several, and especially to those erudite and learned persons who have favoured me with a passing visit at Reggio. In all it excited but one feeling of delight. So gradual, indeed, is the transition from one tint to another, and such the harmony with which they are blended, that if the eye be accidentally turned away, it reverts in a moment, as if moved by an irresistible desire to gaze still longer on the display. This statement is no exaggeration. It is but the mere fact, in respect to which a language much more glowing would be perfectly consistent with truth; so overpowering is the charm which, if I may use the expression, pervades the scale of our coloured plates."

In an admirable memoir, (which has been translated into the first volume of TAYLOR'S *Scientific Memoirs*,) Professor Nobili examines and compares with natural phenomena all the colours which compose his chromatic

* See *Saturday Magazine*, Vol. XV., pp. 199, 204, 222, and 231.

scale. If the reader be at all interested in the subject of colour, either artistically or scientifically, we strongly recommend him to study this memoir. As we are about to inform the reader of an easy method of producing these beautiful colours, we can find space for only a few short extracts. This we do the more readily because in our notices of the Soap Bubble, already referred to, a popular account is given of the principles upon which colour is produced by thin plates or films.

The colours which the clouds assume, are, in general,

Black, or very pure ash-colour;
White, or very light ash-colour;
The colour of smoke or coffee;
Red, more or less fiery;
Blue, very deep, and sometimes approaching to violet.

These are exactly the tints that would constitute the first ring, were we to include in it the first two colours of the second ring. The tints of *smoke* result from the more or less thorough blending of the blond and the tawny; those of *fire* from Nos. 8, 9, and 10; the deep blue is produced by the Nos. 10, 11, and 12, which are the deepest tints of the scale.

The first blond is properly that of light hair in childhood, and it is a fact worthy of remark, that as children grow older, it becomes progressively deeper and deeper, in the order of the Nos. 2, 3, and 4, in the scale. The perfect resemblance of the first tints on the scale to those which we observe about the moon when she is surrounded by clouds, is equally remarkable; it seems in fact that this luminous appearance may be thus definitively explained. Tints of this kind do not arise from refraction and diffraction, they are produced only by means of thin plates; the luminous halo seen round the moon when overcast with fog or light clouds, is therefore a phenomenon produced by thin plates.

This observation, combined with the fact, that the tints exhibited by the clouds in every variety of aspect, are almost all comprised in the first ring, leads to another consequence relative to the constitution of vesicular vapours. The measurements and experiments of Newton have shown what are the dimensions of the layers of air, of water, and of glass, which produce the colours of the several rings. The red of No. 10, is the last tint of the first ring; the indigo, No. 12, belongs to the second; and the thickness of the layer of water, which produces it by reflection, is about the ten-millionth part of an English inch. As we know then, on the one hand, that the vesicular vapours are formed of water, and on the other, that they do not reflect or transmit any tint beyond No. 12; we may conclude, that their external film is in no case thicker than the ten-millionth part of an inch.

This result appears to Professor Nobili so decidedly certain as to be entitled to a place in science.

In speaking of the tints of the second ring, he says, We have the sky, their type in nature, constantly before our eyes; for who is there that knows not the dawn, "with rosy forehead and golden feet"? Beginning with No. 12 of the scale, let us run our eye over it as far as No. 28, and we shall find that the tints of the sky are disposed there in the order in which they present themselves in the magnificent spectacle of the dawning day. This succession, as we have already observed, is the most beautiful of all: Newton's second ring gives no idea of it, because its colours are not, and cannot be, sufficiently developed to produce the effect. Painters, if I mistake not, will do well to avail themselves of this part of the scale; they will find it a faithful copy of the beautiful tints of the morning, and endeavour to transfer them to their compositions. Natural philosophers will not fail to remark, that among the various tints of the sky there is no trace of green. This would heretofore have been found a perplexing circumstance, but it may now be satisfactorily explained, merely by reflecting that the tints of the sky belong to the second order, in which also there is no tinge of green. From the blue to the yellow, the transition is through a very faint gradation of azure-yellow, and this is observed to be exactly the case in nature.

The tints produced by the vapours and clouds belong to the second order. They contain in general more fire than the natural tints of the sky, but this quality is nothing in comparison with the purity, vividness, and variety, displayed in the tints of the second order. The appearance of the sun is never so magnificent as when the air is perfectly pure. Toward evening the lower regions of the atmosphere are always more or less charged with vapours, the air no longer retains its morning transparency, and the setting of the sun is attended by a fiery tint, which greatly mars the tranquil beauty of the spectacle. It is to those vapours that we are to attribute the inflamed appearance of the sky, because they possess the power of transmitting the tints of the first order, and those are of that fiery cast. Were it not for this circumstance, the setting of the sun might justly vie with its rising.

Philosophers had long since settled their opinions as to the colours of the sky. These they explained by assigning to the air the property of reflecting the higher colours of the spectrum, (violet, indigo, &c.,) and that of transmitting the lower, (red, orange, &c.) The explanation was correct, so far as it went, but to make it complete the exact quality of the tints should be determined by indicating the order to which they belong. It was necessary also to ascertain how light is affected by the presence of vapours. The considerations which we have just stated will perhaps supply both these deficiencies.

A singular property is connected with some of the tints of the scale. If a drop of alcohol is let fall on the violet, No. 11, (as also upon a few other tints immediately above and below this No.,) and spread so as to cover part of the colour, the part thus made wet is no longer the same; we see instead of it a feeble tint resembling that of coffee mixed with milk; but the other part remains unchanged. The comparison can be made instantaneously, and the difference between the two tints is so striking, that we are at a loss to conceive how a transparent and very limpid film of alcohol can produce such a change in the violet colour on which it is placed. The alcohol gradually evaporates, and the colour recovers its former brilliancy. Water, oil, and the different saline solutions, produce the same effect.

The prismatic colours produced on steel and copper by the action of fire, and the colours exhibited by tin, bismuth, lead, &c., when in a state of fusion, have been supposed to result from the oxidation of those metals. This explanation may reasonably be doubted. The blue or violet colour which is sometimes given to steel is to secure it from rust. This colour is produced by means of fire in the process of giving steel a particular temper —a temper which is called violet, because it is produced simultaneously with the colour. If this tint were the effect of oxidation, would it not rather accelerate than prevent oxidation? A very high degree of polish will keep off rust for a long time, but cannot stop it when once the action has commenced.

According to Professor Nobili the colours of which we now speak belong to the same class as those produced by tin plates, and he concludes that no oxide is formed upon the surface of the steel, because, 1st, the metal retains, beneath the deposited layer, its natural brilliancy; 2nd, this layer produces the phenomenon of the coloured rings in all its beauty; and 3rd, instead of oxidizing or rusting the metal, the coloured film contributes to secure it against rust in every part to which it is applied, as was proved by exposing two steel plates, one only of them being coloured, in the open air, to all the vicissitudes of a rainy autumn; when at the end of a month the uncoloured plate was all rusted, the other had lost a little of its colour, but was free from rust.

Considering then, that by the electro-chemical means stated at the beginning of this article, the films can be deposited with equal facility upon platinum, a metal difficult to be oxidized, as upon iron and steel, which belong to a class of metals most easily oxidized, as well as from the results of numerous collateral experiments, it appears that oxygen and certain acids may adhere to the surfaces of metals without producing the slightest chemical change in them. It may be laid down as a general proposition, that the oxygen of the atmosphere produces the colours on metals by the action of fire, not, as is supposed, by oxidizing the surface of the metal, but, by becoming fixed in the form of a thin plate, or film, similar to those produced by the electro-chemical process.

If a plate of copper be laid upon a red-hot iron, the plate becomes gradually heated, and all at once exhibits the most beautiful colours, but they disappear as suddenly. Before it becomes coloured, the plate has a metallic lustre; it subsequently ceases to shine, and becomes evidently oxidized. It is therefore at the moment when the colours manifest themselves that the oxygen of the air precipitates itself on the copper. In the next moment the chemical combination is effected, which takes place whenever the action of the heat is sufficiently prolonged. If the plate of copper be removed from the red-hot iron as soon as the first indication of a change of colour is perceived at any point, the process of coloration will then go on more slowly, the copper will not be oxidized, and the oxygen, which would produce this effect under a more prolonged action of the heat, now covers the plate with a film, which adheres to it like a varnish, and by its transparency produces the usual colours.

The origin of the violet colour given to steel to prevent it from rusting, is the same. The layer, however, which produces this tint in the steel does not perhaps consist solely of oxygen, as it does when the metals are pure. Steel is a compound of iron and carbon, and the oxygen of the air precipitated on this compound being combined with the carbon in some manner or other, might form the layer in question. At all events the layer does not change its nature; it is always electro-negative, and secures the metal from rust as effectually as the layers applied by the electro-chemical process.

By this latter process, as we have said, films are formed on the surface of metals with surprising rapidity, and the colours developed on metals exposed to the action of heat, are produced with equal promptitude. It is therefore essential to the production of the phenomenon of thin plates, that the electro-negative elements should be precipitated on the metal with a certain velocity. "Does not the necessity of this condition show why these layers, in order to produce the desired effect, should be brought into contact with the metallic surface by the agency either of fire or electricity? The action of moisture is, perhaps, too tedious in all cases; it gradually oxidizes the surfaces of the metals, but never covers them with that thin and extended veil, the application of which requires a rapidity unattainable in this circumstance."

At the present time, when a voltaic battery can be procured by every one at the cost of a few pieces of copper and zinc, it is certainly not too much to expect that many of our readers will repeat the beautiful experiments of which we have detailed a few of the results. Care must be taken in the use of the acetate of lead, because this salt is very poisonous. A solution must be made with rain water, and should it not be perfectly clear, it must be filtered through blotting paper.

It is a misfortune not to possess enough intelligence to enable one to speak with propriety, nor sufficient judgment to know when to be silent.—De la Bruyere.

It is not the reality of grievances so much as the temper with which they are viewed, which produces a revolution.

That only which is becoming is good; therefore virtue is to be pursued for its own sake; and, because it is a divine attainment, it cannot be taught, but is the gift of God. He alone who has attained the knowledge of the first good is happy. The end of this knowledge is, to render man as like to God as the condition of human nature will permit. This likeness consists in prudence, justice, sanctity, temperance. In order to attain this state, it is necessary to be convinced that the body is a prison, from which the soul must be released before it can arrive at the knowledge of those things which are real and immutable.—Plato.

CURIOUS CHESS PROBLEMS.

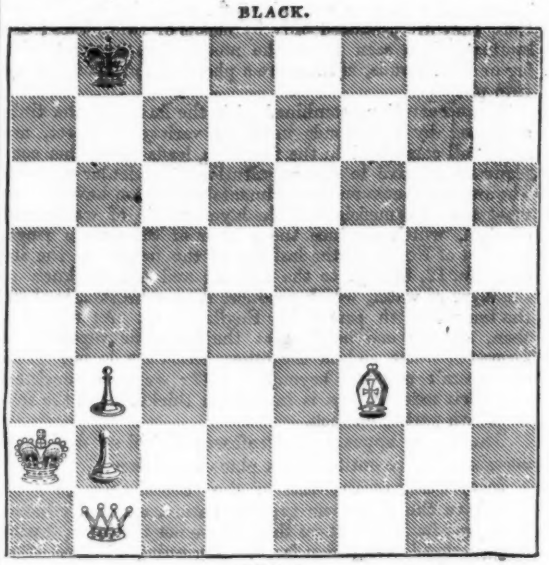
X.

On first glancing at the following problem, the young student will probably suppose that its solution is impossible on the terms proposed. An attentive examination of the position of the pieces will, however, soon lead him to effect the solution of this by no means difficult problem. The solution is, indeed, rendered more easy by the terms, which, at first sight, seem greatly to add to its difficulty. Being required to check on the fourth move with one pawn, and to give checkmate at the fifth move with another pawn, the student is thus made acquainted with two moves out of the five, so that the number of moves to be discovered is, in fact, reduced to three.

This problem was originally invented by that great master, Damiano, who gives the player of the white pieces a Rook instead of a Bishop, and requires the mate to be given in eight moves; but Carrera made the problem more difficult by substituting a Bishop, and requiring the mate to be given in five moves.

White to move first and to mate with the Pawn which now occupies the Queen's Knight's second square, in five moves; checking on the fourth move with the Pawn which now occupies the Queen's Knight's third square.

BLACK.



WHITE.

In the cultivation of literature is found that common link, which among the higher and middling departments of life unites the jarring sects and subdivisions in one interest; which supplies common topics, and kindles common feelings, unmixed with those narrow prejudices, with which all professions are more or less infected. The knowledge, too, which is thus acquired, expands and enlarges the mind, excites its faculties, and calls those limbs and muscles into freer exercise, which, by too constant use in one direction, not only acquire an illiberal air, but are apt also to lose somewhat of their native play and energy. And thus, without directly qualifying a man for any of the employments of life, it enriches and ennobles all: without teaching him the peculiar benefits of any one office or calling, it enables him to act his part in each of them with better grace and more elevated carriage; and, if happily planned and conducted, is a main ingredient in that complete and generous education, which fits a man to perform justly, skilfully, and magnanimously, all the offices, both public and private, of peace and war.—Bishop Copleston.

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